

REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is requested. Claims 1-15 and 21-24 are in this application. Claims 1 and 15 have been amended. Claims 21-24 have been added to alternately claim the present invention. In addition to the amendments discussed below, claim 15 was amended to correct an inadvertent error.

Applicant requests that the Examiner initial and return a copy of the 1449 Form filed on February 10, 2004, and received by the PTO on February 13, 2004.

The Examiner rejected claims 1-15 under 35 U.S.C. §102(e) as being anticipated by Yamauchi et al. (U.S. Patent No. 6,836,001 B2). For the reasons set forth below, applicant respectfully traverses this rejection.

Claim 1 has been amended, and recites

“a first region of a first conductivity type;  
“a second region of a second conductivity type that lies over the first region;  
“a third region of the first conductivity type that contacts the second region, the third region being spaced apart from the first region; and  
“a fourth region of the second conductivity type that contacts the third region, the fourth region being spaced apart from the second region.”

In rejecting the claims, the Examiner pointed to n+ substrate 41 shown in FIGS. 15, 16A-16H, and 20A-20G of Yamauchi as constituting the first region required by claim 1, and p- region 43 shown in FIGS. 15, 16A-16H, and 20A-20G of Yamauchi as constituting the second region required by claim 1. In addition, the Examiner pointed to n-type region 45 shown in FIGS. 15 and 16A-16H (n-type region 45 is not shown in FIGS. 20A-20G) of Yamauchi as constituting the third region required by claim 1, and p- region 44 shown in FIGS. 15, 16A-16H, and 20A-20G of Yamauchi as constituting the fourth region required by claim 1.

P-regions 43 and 44, however, can not be read to be the second and fourth regions, respectively, of claim 1 because p-type regions 43 and 44 are not spaced apart. As shown in FIGS. 15, 16A-16H, and 20A-20G, Yamauchi teaches that p-type regions 43 and 44 directly contact each other and, therefore, can not be spaced apart.

Thus, since the Yamauchi reference fails to teach spaced-apart second and fourth regions, claim 1 is not anticipated by Yamauchi. In addition, since claims 2-15 depend either directly or indirectly from claim 1, claims 2-15 are not anticipated by Yamauchi for the same reasons as claim 1.

With further respect to claim 5, the Examiner pointed to trenches 6 shown in FIGS. 2 and 9 of Yamauchi as constituting the plug required by claim 5. Applicant notes, however, that FIGS. 2 and 9 are directed to an embodiment that is described with different reference numerals than the embodiments shown in FIGS. 15, 16A-16H, and 20A-20G of Yamauchi. As a result, the Examiner's comments with respect to FIGS. 15, 16A-16H, and 20A-20G of Yamauchi can not be applied to FIGS. 2 and 9 because there are no common reference numerals between the embodiments.

Further, the Examiner does not appear to have identified the structures in FIGS. 2 and 9 that the Examiner believes reads on the first, second, third, and fourth regions required by claim 5. Thus, since the Examiner's comments with respect to FIGS. 15, 16A-16H, and 20A-20G of Yamauchi can not be applied to FIGS. 2 and 9, and the Examiner did not identify the structures in FIGS. 2 and 9 that read on the first, second, third, and fourth regions, claim 5 is not anticipated by Yamauchi for this additional reason.

With respect to claim 8, the Examiner merely argued that Yamauchi teaches in FIG. 2 an insulating layer that contacts the first and second regions. As noted above, the Examiner does not appear to have identified the first and second regions in FIG. 2. As a result, applicant can not determine whether Yamauchi teaches in FIG. 2 an insulating layer that contacts the first and second regions. Thus, claim 8 is not anticipated by Yamauchi for this further reason.

New claim 21 recites, part:

“a first region of a first conductivity type;  
“a second region of a second conductivity type that lies over the first region;  
“a third region of the first conductivity type that contacts the second region;  
“a fourth region of the second conductivity type that contacts the third region;  
“a trench having a sidewall that extends from the top surface of the fourth region through the fourth region, the third region, and partially into the second region;  
“a layer of insulation material that contacts all of the sidewall of the trench.”

In rejecting the claims, the Examiner pointed to trenches 50 and 53 as constituting the trench required by the claims. The Examiner also pointed to gate oxide film 54 as constituting the insulation layer required by the claims. Gate oxide film 54, however, can not be read to be the insulation layer required by claim 21 because gate oxide film 54 does not contact all of a sidewall of the trench.

As shown in FIGS. 15, 16A-16H, and 20A-20G, Yamauchi teaches that gate oxide film 54 does not contact any portion of the sidewalls of trench 50. Thus, since gate oxide film 54 does not contact all of a sidewall of trench 50, claim 21 is not anticipated by Yamauchi. In addition, since claims 22-24 depend either directly or indirectly from claim 21, claims 22-24 are not anticipated by Yamauchi for the same reasons as claim 21.

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Thus, for the foregoing reasons, it is submitted that all of the claims are in a condition for allowance. Therefore, the Examiner's early re-examination and reconsideration are respectively requested.

Respectfully submitted,

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